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ABSTRACT

This paper provides architects and educational planners with data on the necessary space requirements for restrooms, mechanical rooms, custodial spaces, food service, construction enclosure space, and circulation and corridor space, as well as an ongoing indication of necessary building area per student. It offers itemized data to illustrate variations and similarities in elementary schools, junior high/middle schools, K-12 schools, and high schools. Data were extracted from the final construction drawings of 158 educational facilities designed and constructed over the last 12 years. The paper presents general facility data and itemization of facility research data. Results show that programming percentages for the various categories can vary dramatically, depending on building systems utilized, type of building enclosure, and efficiency of the design. Based on the facilities examined, 32-38 percent should be added to net programmed areas for construction and circulation, depending on the type of building being developed. Net programmed areas should include the necessary restroom, custodial, mechanical/electrical, and food service requirements. (SM)

ED 479 734

PROGRAMMING Circulation Factors in K-12 Facilities

(U P D A T E D R E S E A R C H)

CEFPI Mini-Session P R E S E N T A T I O N

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October 21, 2002

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PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
CEFPI MINI-SESSION PRESENTATION
Phoenix, Arizona
October 21, 2002

TABLE OF CONTENTS

	PAGE
Introduction and Purpose.....	1
General Facility Data	
High Schools	3
Middle Schools	4
Elementary Schools	5-6
K12 Schools	7
Itemization of Facility Research Data	
High Schools	9-10
Middle Schools	11-12
Elementary Schools	13-16
K12 Schools	17
Summary of Findings	19-27
Fanning/Howey Associates, Inc. Profile	29-30

INTRODUCTION AND PURPOSE

This presentation provides research data regarding the necessary space requirements for restrooms, mechanical rooms, custodial spaces, food service, construction enclosure space, and circulation and corridor space, as well as an on-going indication of necessary building area per student.

Itemized data will be presented to illustrate variations and similarities in the following categories: elementary schools, junior high/middle schools, K12 schools, and high schools.

The data was extracted from the final construction drawings of 158 educational facilities designed and constructed within the last twelve years. The presentation is directed towards educational facility planners, architects, and others involved in programming space for new facilities, and will assist in helping to assure planners of necessary space requirements prior to the architectural design process.

The goal of this presentation is to begin a dialogue between planners and architects regarding the appropriate factors to be applied to net programmed space in order to reach total building area, resulting in a more realistic budgeting process.

General Facility Data

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF HIGH SCHOOLS

	<u>Name of School</u>	<u>State</u>	<u>GSF</u>	<u># of Floors</u>	<u># of Students</u>	<u>Core Capacity</u>	<u>SF/student</u>
1	Marysville HS	OH	186,294	2	1,200	1,200	155
2	Williamston HS	MI	105,038	1	600	600	175
3	N.Harrison HS	IN	149,733	2	800	800	187
4	Imlay City HS	MI	131,194	2	830	900	158
5	Gaylord HS	MI	190,853	2	1,200	1,200	159
6	Dakota HS	MI	398,578	2	2,000	2,000	199
7	Dublin Scioto HS	OH	228,625	2	1,200	1,800	191
8	Brecksville BHHS	OH	293,715	3	1,800	1,800	163
9	Northridge HS	OH	95,994	1	500	500	192
10	Leslie HS	MI	131,443	1	510	650	258
11	Springboro HS	OH	217,523	2	1,200	1,600	181
12	Ocean Lakes HS*	VA	306,792	2	2,300	2,300	133
13	DeWitt HS	MI	224,067	2	1,000	1,200	224
14	Holly HS	MI	253,521	2	1,600	2,200	158
15	Northville HS	MI	362,000	2	1,680	2,200	215
16	Three Rivers HS	MI	194,563	1	850	850	229
17	Chesterton HS	IN	514,090	2	2,200	2,500	234
18	Spring Lake HS	IN	174,290	1	750	750	232
19	Perrysburg HS	OH	285,390	2	1,600	2,000	178
20	Vinton County HS	OH	131,118	1	800	800	164
21	Twinsburg HS/Fitness	OH	333,356	2	1,200	1,500	278
22	Claymont HS	OH	123,090	2	746	750	165
23	Avon HS	IN	425,000	2	1,800	1,800	236
24	Linton HS	IN	76,533	2	450	600	170
25	Greeneview HS	OH	90,950	2	550	550	165
26	Standish Sterling CHS	MI	140,450	2	900	900	156
27	Sawsville HS	VA	110,673	2	600	600	184
28	Goshen HS	OH	139,796	2	838	838	167
29	Milan HS*	MI	266,976	2	900	900	297
30	Bethel-Tate HS	OH	98,864	2	600	600	165
31	Romeo Eng. & Tech	MI	91,000	2	600	720	152
32	Lima Sr. HS	OH	284,861	2	1,356	1,356	210
33	Glen Oaks HS	NY	207,149	5	1,090	1,090	190
34	HSE Freshman	IN	243,349	2	1,000	1,000	243
35	Olentangy HS	OH	303,000	2	1,600	1,600	189
36	Tippecanoe HS	OH	185,026	2	1,000	1,200	185
37	Blessed T.Guerin HS	IN	165,000	1	800	800	206
38	Pickerington HS	OH	304,163	2	1,800	1,800	169
39	New Lebanon HS	OH	91,683	1	550	550	167
AVERAGE			211,686		1,103		192
AVERAGE*			207,621		1,076		193

*(Taking out the schools with the highest & lowest SF/student)

(Core capacity means the student capacity of the media center, cafeteria, gymnasium, etc.)

The schools in bold type were added to this year's analysis.

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF MIDDLE SCHOOLS

	<u>Name of School</u>	<u>State</u>	<u>GSF</u>	<u># of Floors</u>	<u># of Students</u>	<u>SF/student</u>
1	Avondale MS	MI	103,023	1	600	172
2	Meridian MS	IL	80,167	2	650	123
3	A.I.Root MS	OH	131,612	1	700	188
4	Wilson MS	IN	213,803	2	1,100	194
5	N.Oldham MS*	KY	79,504	1	700	114
6	S.Vermillion MS	IN	126,088	1	720	175
7	Discovery MS	IN	165,435	2	900	184
8	Woodridge MS	OH	79,115	1	550	144
9	Crestview MS*	IN	160,623	1	750	214
10	Lincoln MS	IN	187,922	1	900	209
11	Greyhound IS	MI	88,964	2	550	162
12	Novi MS	MI	215,055	1	1,058	203
13	HSE JHS	IN	171,100	2	1,000	171
14	Celina IS	OH	81,083	2	650	125
15	St. Johns MS	MI	127,258	1	778	164
16	S.Dearborn MS	IN	128,224	1	720	178
17	Rapid Run MS	OH	126,773	2	750	169
18	Harmon MS	OH	93,048	1	750	124
19	Diley MS	OH	95,616	1	750	127
20	Graham MS	OH	102,547	1	675	152
21	Stanton MS	OH	146,889	1	1,000	147
22	Fall Creek IS	IN	137,218	1	1,000	137
23	Sand Creek IS	IN	137,218	1	1,000	137
24	Discovery MS	MI	133,119	1	765	174
25	Franklin 5-6	IN	178,452	1	1,200	149
26	Zionsville MS	IN	249,932	2	1,600	156
27	Charlotte MS	MI	192,000	1	1,100	175
28	Lima West MS	OH	70,255	2	505	139
29	Pickerington JHS	OH	142,528	2	850	168
30	Tiffin MS	OH	103,494	2	734	141
31	Niles MS	OH	93,060	2	660	141
32	South MS,Lima	OH	77,253	2	504	153
33	Hamilton IS	IN	96,205	1	774	124
34	Kelly Miller MS	DC	107,546	3	600	179
35	Blacksburg MS	VA	190,978	2	1,200	159
36	Christiansburg MS	VA	168,864	2	900	188
37	Salem MS	NC	158,086	2	1,000	158
	AVERAGE		133,515		828	161

AVERAGE* 134,284 834 161

*(Taking out the schools with the highest & lowest SF/student)

The schools in bold type were added to this year's analysis.

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF ELEMENTARY SCHOOLS

	<u>Name of School</u>	<u>State</u>	<u>GSF</u>	<u># of Floors</u>	<u># of Students</u>	<u>SF/student</u>
1	Horace Mann ES	IN	64,166	1	500	128
2	New Britton ES	IN	78,886	1	650	121
3	Batesville ES	IN	75,050	1	600	125
4	Knox Comm. ES	IN	83,053	1	640	130
5	Smoky Row ES	IN	91,420	1	725	126
6	Anna ES	OH	69,026	1	600	115
7	Wyandot Run ES	OH	80,130	1	650	123
8	Flint Lake ES	IN	86,436	2	600	144
9	Taylor Road ES	OH	52,430	1	525	100
10	Timmons ES	OH	90,127	1	750	120
11	Joan Martin ES	IN	87,732	1	700	125
12	Wash Irv Sch #14	IN	93,458	2	677	138
13	Schultz ES	OH	55,609	1	525	106
14	Horizon ES	IN	91,844	1	720	128
15	Lantern Rd. ES	IN	78,921	1	625	126
16	Suncrest ES	IN	81,549	1	650	125
17	Oak Hill ES	IN	71,623	1	600	119
18	Alum Creek ES	OH	82,330	1	650	127
19	Tussing ES	OH	76,492	1	650	118
20	Sabina ES	OH	55,600	1	600	93
21	New Vienna ES	OH	43,001	1	340	126
22	Columbia ES	OH	96,659	1	650	149
23	Rose Pioneer ES	MI	59,371	1	475	125
24	Union Local ES*	OH	79,478	1	900	88
25	Springfield ES	IN	72,656	1	470	155
26	Edison ES	IN	84,703	1	600	141
27	Morton ES	IN	84,703	1	600	141
28	Maywood ES	IN	87,671	1	600	146
29	Gateway North ES	MI	54,653	1	300	182
30	Oakview South ES	MI	54,653	1	300	182
31	Fishback Creek PA	IN	91,412	1	600	152
32	Buckner ES	KY	70,692	2	600	118
33	Prairie Trace ES	IN	88,742	1	725	122
34	Harrison Parkway ES	IN	78,921	1	650	121
35	Meadows Edge ES	IN	57,224	1	450	127
36	Northpoint ES	IN	57,224	1	450	127
37	Towne Meadow ES	IN	87,471	1	725	121
38	Discovery ES*	MI	79,400	1	400	199
39	Deerfield ES	MI	83,084	1	560	148
40	Cheyenne ES	MI	101,000	1	800	126
41	Scioto Ridge ES	OH	72,830	1	650	112
42	Arrowhead ES	OH	72,830	1	650	112
43	Oak Creek ES	OH	71,419	1	650	110
44	Tyler Run ES	OH	72,803	1	650	112
45	Hoosier Rd. ES	IN	78,850	1	650	121
46	S. Lebanon ES	OH	75,008	2	500	150

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF ELEMENTARY SCHOOLS (cont.)

	<u>Name of School</u>	<u>State</u>	<u>GSF</u>	<u># of Floors</u>	<u># of Students</u>	<u>SF/student</u>
47	Kings Mills ES	OH	78,285	2	600	130
48	H.G. Blake ES	OH	75,191	1	600	125
49	Ryan Park ES	IN	78,679	1	500	157
50	Leighton ES	OH	79,978	1	700	114
51	Monroe Road ES	MI	76,360	1	700	109
52	Moreland Hills ES	OH	124,875	1	1,000	125
53	Snacks Crossing ES	IN	94,866	1	700	136
54	Auburn ES	VA	81,740	1	650	126
55	Zionsville ES	IN	88,590	2	600	148
56	Freedom ES	OH	59,469	1	500	119
57	Unity ES	OH	59,480	2	500	119
58	Montgomery ES	OH	78,675	3	625	126
59	Brooks School Elem	IN	93,333	1	700	133
60	Blue Ash ES	OH	80,821	1	625	129
61	Harrison ES	IN	119,724	1	872	137
62	South Park ES	PA	114,992	2	800	144
63	Andrews ES	IN	73,458	1	412	178
64	Flint Springs ES	IN	82,694	1	562	147
65	Lincoln ES	IN	84,014	1	562	149
66	Ridge Wood ES	MI	80,310	1	450	178
67	Patterson ES	DC	81,007	3	520	156
68	Mary Beck ES	IN	89,615	2	600	149
69	Max Larsen ES	MI	64,914	2	425	153
70	Hevel ES	MI	72,783	1	463	157
71	Deer Meadow PS**	IN	68,020	1	378	180
72	Crown Point ES	IN	91,000	1	650	140
73	Stockbridge ES	MI	62,963	1	425	148
	AVERAGE		78,605		599	131
	AVERAGE*		78,582		597	132

*(Taking out the schools with the highest & lowest SF/student)

The school in bold type were added to this year's analysis.

** with core facilities for 600 students

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF K-12 SCHOOLS

	<u>Name of School</u>	<u>State</u>	<u>GSF</u>	<u># of Floors</u>	<u># of Students</u>	<u>Core Capacity</u>	<u>SF/student</u>
1	Twin Valley South	OH	198,890	1	1,300	1,300	153
2	Edon Northwest PK-12	OH	131,153	1	890	890	147
3	Ft. Jennings PK-12	OH	103,235	1	643	643	161
4	Mississinawa K-12	OH	112,585	1	750	750	150
5	Adena K-12*	OH	189,112	1	1,414	1,414	134
6	Riverdale K-12	OH	164,522	1	1,174	1,174	140
7	Morgan Township K-12*	IN	137,000	1	775	775	177
8	New London K-12	OH	162,485	1	1,200	1,200	135
9	Antwerp K-12	OH	140,135	1	982	982	143
	AVERAGE		148,791		1,014		147

AVERAGE* 144,715 991 146

*(Taking out the schools with the highest & lowest SF/student)

(Core capacity means the student capacity of the media center, cafeteria, gymnasium, etc.)

The schools in bold type were added to this year's analysis.

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*Itemization of Facility
Research Data*

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF HIGH SCHOOL SPACES

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
1	Marysville HS Ohio	186,294 1,200 155	2,659 2.04%	5,429 4.17%	391 0.30%	3,685 2.83%	118,003 90.66%	130,167	21,742 16.70%	34,385 26.42%	56,127 43.12%
2	Williamston HS Michigan	105,038 600 175	1,822 2.39%	3,841 5.03%	262 0.34%	3,226 4.23%	67,164 88.01%	76,315	7,034 9.22%	21,689 28.42%	28,723 37.64%
3	N.Harrison HS Indiana	149,733 800 187	3,143 2.96%	6,093 5.73%	947 0.89%	3,372 3.17%	92,722 87.25%	106,277	10,138 9.54%	33,318 31.35%	43,456 40.89%
4	Imlay City HS Michigan	131,194 830 158	1,910 2.09%	3,188 3.49%	202 0.22%	4,420 4.84%	81,685 89.37%	91,405	12,461 13.63%	27,328 29.90%	39,789 43.53%
5	Gaylord HS Michigan	190,853 1,200 159	3,720 2.54%	8,562 5.84%	1,808 1.23%	4,813 3.28%	127,746 87.11%	146,649	11,457 7.81%	32,747 22.33%	44,204 30.14%
6	Dakota HS Michigan	398,578 2,000 199	8,817 3.18%	15,185 5.47%	665 0.24%	5,160 1.86%	247,705 89.25%	277,532	48,528 17.49%	72,518 26.13%	121,046 43.62%
7	Dublin Scioto HS Ohio	228,625 1,200 191	6,277 3.77%	13,886 8.34%	937 0.56%	6,195 3.72%	139,257 83.61%	166,552	14,700 8.83%	47,373 28.44%	62,073 37.27%
8	Brecksville BHHS Ohio	293,715 1,800 163	6,643 3.22%	11,352 5.49%	809 0.39%	6,033 2.92%	181,771 87.98%	206,608	26,801 12.97%	60,306 29.19%	87,107 42.16%
9	Northridge HS Ohio	95,994 500 192	2,554 3.74%	4,529 6.62%	1,172 1.71%	3,510 5.13%	56,598 82.79%	68,363	12,501 18.29%	15,130 22.13%	27,631 40.42%
10	Leslie HS Michigan	131,443 510 258	2,404 2.46%	4,592 4.70%	446 0.46%	3,203 3.28%	86,995 89.10%	97,640	9,642 9.88%	24,161 24.74%	33,803 34.62%
11	Springboro HS Ohio	217,523 1,200 181	4,541 2.99%	8,635 5.68%	900 0.59%	5,285 3.48%	132,540 87.25%	151,901	27,619 18.18%	38,003 25.02%	65,622 43.20%
12	Ocean Lakes HS Virginia	306,792 2,300 133	4,677 2.11%	7,081 3.19%	4,122 1.86%	7,094 3.20%	198,663 89.63%	221,637	23,154 10.45%	62,001 27.97%	85,155 38.42%
13	DeWitt HS Michigan	224,067 1,000 224	4,817 2.74%	12,143 6.91%	739 0.42%	4,669 2.66%	153,367 87.27%	175,735	11,487 6.54%	36,845 20.97%	48,332 27.50%
14	Holly HS Michigan	253,521 1,600 158	4,202 2.15%	10,266 5.24%	506 0.26%	3,231 1.65%	177,645 90.70%	195,850	11,029 5.63%	46,642 23.82%	57,671 29.45%
15	Northville HS Michigan	362,000 1,680 215	6,239 2.69%	10,031 4.33%	1,745 0.75%	6,034 2.61%	207,498 89.61%	231,547	56,194 24.27%	74,259 32.07%	130,453 56.34%
16	Three Rivers HS Michigan	194,563 850 229	4,069 2.71%	8,795 5.86%	2,104 1.40%	5,079 3.38%	130,059 86.64%	150,106	10,403 6.93%	34,054 22.69%	44,457 29.62%
17	Chesterton HS Indiana	514,090 2,200 234	10,994 2.82%	26,987 6.91%	1,219 0.31%	8,305 2.13%	342,834 87.83%	390,339	29,461 7.55%	94,290 24.16%	123,751 31.70%
18	Spring Lake HS Michigan	174,290 750 232	2,364 1.78%	11,366 8.56%	596 0.45%	5,380 4.05%	113,045 85.16%	132,751	10,492 7.90%	31,047 23.39%	41,539 31.29%
19	Perrysburg HS Ohio	285,390 1,600 178	6,321 3.22%	8,286 4.22%	1,436 0.73%	8,042 4.10%	172,066 87.72%	196,151	32,983 16.82%	56,256 28.68%	89,239 45.50%
20	Vinton County HS Ohio	131,118 800 164	3,047 3.19%	2,287 2.39%	243 0.25%	2,885 3.02%	87,085 91.14%	95,547	8,151 8.53%	27,420 28.70%	35,571 37.23%

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF HIGH SCHOOL SPACES (cont.)

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
21	Twinsburg HS/Fitness Ohio	333,356 1,200 278	6,162 2.57%	22,397 9.33%	1,484 0.62%	4,267 1.78%	205,647 85.70%	239,957	30,659 12.78%	62,740 26.15%	93,399 38.92%
22	Claymont HS Ohio	123,090 746 165	3,395 3.68%	5,337 5.79%	621 0.67%	2,611 2.83%	80,247 87.03%	92,211	9,538 10.34%	21,341 23.14%	30,879 33.49%
23	Avon HS Ohio	425,000 1,800 236	5,301 1.82%	10,470 3.59%	912 0.31%	9,605 3.30%	265,139 90.98%	291,427	59,765 20.51%	73,808 25.33%	133,573 45.83%
24	Linton HS Indiana	76,533 450 170	2,025 3.65%	4,189 7.55%	575 1.04%	2,871 5.17%	45,840 82.59%	55,500	6,085 10.96%	14,948 26.93%	21,033 37.90%
25	Greeneview HS Ohio	90,950 550 165	1,941 2.68%	4,826 6.65%	141 0.19%	2,197 3.03%	63,415 87.44%	72,520	2,607 3.59%	15,823 21.82%	18,430 25.41%
26	Standish Sterling CHS Michigan	140,450 900 156	2,945 2.71%	7,254 6.67%	979 0.90%	3,486 3.21%	94,070 86.51%	108,734	10,049 9.24%	21,667 19.93%	31,716 29.17%
27	Sawsville HS Virginia	110,673 600 184	2,692 3.46%	3,489 4.48%	530 0.68%	2,550 3.28%	68,537 88.10%	77,798	11,587 14.89%	21,288 27.36%	32,875 42.26%
28	Goshen HS Ohio	139,796 838 167	3,295 3.03%	6,996 6.44%	749 0.69%	2,843 2.62%	94,706 87.22%	108,589	9,295 8.56%	21,912 20.18%	31,207 28.74%
29	Milan HS Michigan	266,976 900 297	5,353 2.78%	14,892 7.75%	1,899 0.99%	3,910 2.03%	166,192 86.45%	192,246	26,457 13.76%	48,273 25.11%	74,730 38.87%
30	Bethel-Tate HS Ohio	98,864 600 165	1,888 2.47%	4,749 6.21%	542 0.71%	3,376 4.42%	65,881 86.19%	76,436	3,376 4.42%	19,052 24.93%	22,428 29.34%
31	Romeo Eng. & Tech Michigan	91,000 600 152	2,399 3.88%	2,043 3.30%	452 0.73%	2,234 3.61%	54,743 88.48%	61,871	8,059 13.03%	21,070 34.05%	29,129 47.08%
32	Lima Senior HS Ohio	284,861 1,356 210	5,553 2.54%	15,422 7.06%	3,765 1.72%	4,413 2.02%	189,199 86.65%	218,352	19,141 8.77%	47,368 21.69%	66,509 30.46%
33	Glen Oaks HS New York	207,149 1,090 190	5,230 3.45%	19,202 12.68%	1,778 1.17%	4,250 2.81%	120,932 79.88%	151,392	22,613 14.94%	33,144 21.89%	55,757 36.83%
34	HSE Freshman Indiana	243,349 1,000 243	4,595 2.88%	14,734 9.24%	2,293 1.44%	8,718 5.47%	129,109 80.97%	159,449	36,107 22.64%	47,793 29.97%	83,900 52.62%
35	Olentangy HS Ohio	303,000 1,600 189	6,398 2.91%	17,721 8.07%	474 0.22%	4,326 1.97%	190,711 86.83%	219,630	21,253 9.68%	62,117 28.28%	83,370 37.96%
36	Tippecanoe HS Ohio	185,026 1,000 185	4,177 3.12%	6,857 5.13%	719 0.54%	4,231 3.16%	117,731 88.05%	133,715	16,944 12.67%	34,367 25.70%	51,311 38.37%
37	Blessed T.Guerin HS Indiana	165,000 800 206	4,549 3.56%	3,410 2.67%	501 0.39%	5,095 3.99%	114,100 89.38%	127,655	5,529 4.33%	31,816 24.92%	37,345 29.25%
38	Pickerington HS Ohio	304,163 1,800 169	7,392 3.27%	13,755 6.08%	1,589 0.70%	6,083 2.69%	197,580 87.27%	226,399	14,329 6.33%	63,435 28.02%	77,764 34.35%
39	New Lebanon HS Ohio	91,683 550 167	2,024 2.89%	4,364 6.22%	345 0.49%	2,248 3.21%	61,151 87.19%	70,132	6,746 9.62%	14,805 21.11%	21,551 30.73%
HS AVERAGE		192 GSF/student	2.87% Toilet Rm	5.97% M/E	0.71% Janitor	3.23% Food Svc	87.21% Other		11.54% Const	25.84% Circ	37.38% C & C

COMPARISONS OF MIDDLE SCHOOL SPACES

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
1	Avondale MS Michigan	103,023 600 172	2,833 3.68%	7,712 10.01%	535 0.69%	1,912 2.48%	64,016 83.13%	77,008	7,272 9.44%	18,743 24.34%	26,015 33.78%
2	Meridian MS Illinois	80,167 650 123	2,268 3.77%	4,752 7.89%	412 0.68%	1,296 2.15%	51,484 85.50%	60,212	6,922 11.50%	13,033 21.65%	19,955 33.14%
3	A.I.Root MS Ohio	131,612 700 188	2,332 2.39%	10,462 10.72%	287 0.29%	2,862 2.93%	81,639 83.66%	97,582	13,766 14.11%	20,264 20.77%	34,030 34.87%
4	Wilson MS Indiana	213,803 1,100 194	4,023 2.52%	7,653 4.79%	994 0.62%	5,276 3.30%	141,762 88.76%	159,708	18,795 11.77%	35,300 22.10%	54,095 33.87%
5	N.Oldham MS Kentucky	79,504 700 114	1,673 2.73%	2,548 4.16%	443 0.72%	2,728 4.45%	53,846 87.93%	61,238	6,357 10.38%	11,909 19.45%	18,266 29.83%
6	S.Vermillion MS Indiana	126,088 720 175	3,710 3.90%	6,352 6.68%	520 0.55%	2,629 2.76%	81,941 86.12%	95,152	9,959 10.47%	20,977 22.05%	30,936 32.51%
7	Discovery MS Indiana	165,435 900 184	3,309 2.73%	8,297 6.85%	446 0.37%	2,946 2.43%	106,084 87.61%	121,082	13,251 10.94%	31,102 25.69%	44,353 36.63%
8	Woodridge MS Ohio	79,115 550 144	2,377 4.00%	6,069 10.20%	692 1.16%	2,440 4.10%	47,916 80.54%	59,494	4,740 7.97%	14,881 25.01%	19,621 32.98%
9	Crestview MS Indiana	160,623 750 214	3,517 3.02%	8,830 7.59%	356 0.31%	3,395 2.92%	100,246 86.16%	116,344	13,034 11.20%	31,245 26.86%	44,279 38.06%
10	Lincoln MS Indiana	187,922 900 209	4,144 2.82%	9,416 6.40%	507 0.34%	4,582 3.11%	128,461 87.32%	147,110	10,458 7.11%	30,354 20.63%	40,812 27.74%
11	Greyhound IS Michigan	88,964 550 162	2,435 3.76%	4,405 6.80%	269 0.42%	3,808 5.88%	53,889 83.15%	64,806	6,322 9.76%	17,836 27.52%	24,158 37.28%
12	Novi MS Michigan	215,055 1,058 203	4,434 2.83%	11,349 7.25%	1,251 0.80%	4,185 2.67%	135,335 86.45%	156,554	15,210 9.72%	43,291 27.65%	58,501 37.37%
13	HSE JHS Indiana	171,100 1,000 171	3,698 3.09%	5,855 4.89%	1,523 1.27%	3,570 2.98%	105,199 87.78%	119,845	20,252 16.90%	31,003 25.87%	51,255 42.77%
14	Celina IS Ohio	81,083 650 125	1,898 3.37%	3,016 5.35%	136 0.24%	2,104 3.73%	49,213 87.31%	56,367	7,650 13.57%	17,066 30.28%	24,716 43.85%
15	St. Johns MS Michigan	127,258 778 164	3,425 3.36%	7,990 7.83%	482 0.47%	2,456 2.41%	87,708 85.94%	102,061	2,098 2.06%	23,099 22.63%	25,197 24.69%
16	S.Dearborn MS Indiana	128,224 720 178	2,499 2.62%	5,422 5.69%	411 0.43%	3,219 3.38%	83,756 87.88%	95,307	2,653 2.78%	30,264 31.75%	32,917 34.54%
17	Rapid Run MS Ohio	126,773 750 169	3,025 3.24%	7,274 7.80%	411 0.44%	2,789 2.99%	79,750 85.52%	93,249	11,483 12.31%	22,041 23.64%	33,524 35.95%
18	Harmon MS Ohio	93,048 750 124	3,593 5.10%	4,224 6.00%	575 0.82%	1,607 2.28%	60,393 85.80%	70,392	7,952 11.30%	14,704 20.89%	22,656 32.19%

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PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF MIDDLE SCHOOL SPACES (cont.)

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
19	Diley MS Ohio	95,616 750 127	3,381 4.66%	4,867 6.70%	632 0.87%	4,607 6.34%	59,127 81.43%	72,614	7,888 10.86%	15,114 20.81%	23,002 31.68%
20	Graham MS Ohio	102,547 675 152	3,156 4.10%	4,683 6.09%	287 0.37%	2,726 3.55%	66,040 85.89%	76,892	7,678 9.99%	17,977 23.38%	25,655 33.36%
21	Stanton MS Ohio	146,889 1,000 147	2,406 2.27%	9,907 9.37%	518 0.49%	4,704 4.45%	88,242 83.42%	105,777	11,471 10.84%	29,641 28.02%	41,112 38.87%
22	Fall Creek IS Indiana	137,218 1,000 137	3,244 3.20%	9,125 9.01%	397 0.39%	4,901 4.84%	83,607 82.56%	101,274	12,216 12.06%	23,728 23.43%	35,944 35.49%
23	Sand Creek IS Indiana	137,218 1,000 137	3,604 3.56%	9,125 9.01%	397 0.39%	4,901 4.84%	83,247 82.20%	101,274	12,216 12.06%	23,728 23.43%	35,944 35.49%
24	Discovery MS Michigan	133,119 765 174	2,673 2.79%	6,896 7.19%	550 0.57%	3,868 4.03%	81,986 85.43%	95,973	11,442 11.92%	25,704 26.78%	37,146 38.70%
25	Franklin 5-6 Indiana	178,452 1,200 149	4,602 3.57%	13,735 10.65%	780 0.60%	4,140 3.21%	105,716 81.97%	128,973	13,337 10.34%	36,142 28.02%	49,479 38.36%
26	Zionsville MS Indiana	249,932 1,600 156	4,248 2.34%	19,751 10.86%	510 0.28%	5,941 3.27%	151,462 83.26%	181,912	17,191 9.45%	50,829 27.94%	68,020 37.39%
27	Charlotte MS Michigan	192,000 1,100 175	4,159 2.90%	10,043 7.00%	990 0.69%	4,268 2.98%	123,919 86.43%	143,379	14,915 10.40%	33,706 23.51%	48,621 33.91%
28	Lima West MS Ohio	70,255 505 139	1,566 3.01%	2,935 5.64%	454 0.87%	1,884 3.62%	45,213 86.86%	52,052	6,023 11.57%	12,180 23.40%	18,203 34.97%
29	Pickerington JHS Ohio	142,528 850 168	3,787 3.83%	5,070 5.13%	469 0.47%	1,759 1.78%	87,838 88.79%	98,923	13,585 13.73%	30,020 30.35%	43,605 44.08%
30	Tiffin MS Ohio	103,494 734 141	2,511 3.22%	3,587 4.61%	313 0.40%	2,668 3.43%	68,807 88.34%	77,886	6,614 8.49%	18,994 24.39%	25,608 32.88%
31	Niles MS Ohio	93,060 660 141	2,696 3.83%	2,902 4.13%	618 0.88%	2,603 3.70%	61,523 87.46%	70,342	10,493 14.92%	12,225 17.38%	22,718 32.30%
32	South MS Ohio	77,253 504 153	1,309 2.29%	3,278 5.74%	480 0.84%	1,917 3.36%	50,119 87.77%	57,103	6,380 11.17%	13,770 24.11%	20,150 35.29%
33	Hamilton IS Indiana	96,205 774 124	2,604 3.57%	5,412 7.41%	373 0.51%	2,746 3.76%	61,857 84.74%	72,992	8,872 12.15%	14,341 19.65%	23,213 31.80%
34	Kelly Miller MS District of Columbia	107,546 600 179	3,541 4.42%	4,071 5.08%	539 0.67%	1,973 2.46%	70,037 87.37%	80,161	6,940 8.66%	20,445 25.50%	27,385 34.16%
35	Blacksburg MS Virginia	190,978 1,200 159	4,916 3.58%	9,920 7.23%	490 0.36%	4,611 3.36%	117,359 85.48%	137,296	13,218 9.63%	40,464 29.47%	53,682 39.10%
36	Christiansburg MS Virginia	168,864 900 188	3,545 2.93%	9,779 8.09%	490 0.41%	4,611 3.82%	102,424 84.75%	120,849	15,936 13.19%	32,079 26.54%	48,015 39.73%
37	Salem MS North Carolina	148,086 1,000 148	3,876 3.74%	6,699 6.46%	658 0.63%	2,451 2.36%	90,003 86.80%	103,687	17,824 17.19%	26,575 25.63%	44,399 42.82%
MS AVERAGE		161 GSF/student	3.32% Toilet Rm	7.09% M/E	0.58% Janitor	3.41% Food Svc	85.61% Other		10.53% Const	24.61% Circ	35.47% C & C

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF ELEMENTARY SCHOOL SPACES

		GROSS SF # of students GSF/student	Toilet Rooms	Mech/ Electrical	Janitor	Food Service	Other Spaces	NET SF	Const.	Circul.	TOTAL C&C
1	Horace Mann ES Indiana	64,166 500 128	1,394 2.92%	2,071 4.34%	454 0.95%	1,732 3.63%	42,041 88.15%	47,692	3,382 7.09%	13,092 27.45%	16,474 34.54%
2	New Britton ES Indiana	78,886 650 121	2,032 3.45%	3,120 5.29%	366 0.62%	2,245 3.81%	51,217 86.84%	58,980	6,302 10.68%	13,604 23.07%	19,906 33.75%
3	Batesville ES Indiana	75,050 600 125	1,994 3.65%	2,656 4.86%	346 0.63%	1,802 3.29%	47,895 87.57%	54,693	5,765 10.54%	14,592 26.68%	20,357 37.22%
4	Knox Comm. ES Indiana	83,053 640 130	2,260 3.59%	5,183 8.23%	125 0.20%	957 1.52%	54,482 86.47%	63,007	5,595 8.88%	14,451 22.94%	20,046 31.82%
5	Smoky Row ES Indiana	91,420 725 126	2,174 3.30%	2,726 4.14%	571 0.87%	2,998 4.55%	57,359 87.13%	65,828	6,921 10.51%	18,671 28.36%	25,592 38.88%
6	Anna ES Ohio	69,026 600 115	1,571 3.12%	3,334 6.63%	172 0.34%	1,660 3.30%	43,571 86.61%	50,308	7,274 14.46%	11,444 22.75%	18,718 37.21%
7	Wyandot Run ES Ohio	80,130 650 123	1,797 3.16%	2,545 4.48%	455 0.80%	2,023 3.56%	49,973 87.99%	56,793	8,080 14.23%	15,257 26.86%	23,337 41.09%
8	Flint Lake ES Indiana	86,436 600 144	2,615 4.14%	5,740 9.09%	508 0.80%	1,932 3.06%	52,362 82.91%	63,157	6,212 9.84%	17,067 27.02%	23,279 36.86%
9	Taylor Road ES Ohio	52,430 525 100	1,196 2.97%	2,522 6.27%	361 0.90%	1,444 3.59%	34,706 86.27%	40,229	3,137 7.80%	9,064 22.53%	12,201 30.33%
10	Timmons ES Ohio	90,127 750 120	2,433 3.40%	5,738 8.02%	238 0.33%	2,133 2.98%	60,994 85.26%	71,536	4,662 6.52%	13,929 19.47%	18,591 25.99%
11	Joan Martin ES Indiana	87,732 700 125	2,250 3.52%	7,356 11.50%	457 0.71%	3,049 4.77%	50,861 79.50%	63,973	8,249 12.89%	15,510 24.24%	23,759 37.14%
12	WashIrVSch#14 Indiana	93,458 677 138	2,338 3.32%	4,072 5.79%	618 0.88%	794 1.13%	62,564 88.89%	70,386	9,501 13.50%	13,571 19.28%	23,072 32.78%
13	Schultz ES Ohio	55,609 525 106	1,638 3.83%	1,519 3.55%	109 0.25%	1,687 3.95%	37,804 88.42%	42,757	4,703 11.00%	8,149 19.06%	12,852 30.06%
14	Horizon ES Indiana	91,844 720 128	1,916 2.87%	6,398 9.58%	237 0.35%	1,362 2.04%	56,893 85.16%	66,806	7,078 10.59%	17,960 26.88%	25,038 37.48%
15	Lantern Rd. ES Indiana	78,921 625 126	1,939 3.16%	3,318 5.41%	324 0.53%	1,950 3.18%	53,775 87.72%	61,306	5,990 9.77%	11,625 18.96%	17,615 28.73%
16	Suncrest ES Indiana	81,549 650 125	2,330 3.77%	3,300 5.34%	350 0.57%	2,620 4.24%	53,231 86.09%	61,831	6,398 10.35%	13,320 21.54%	19,718 31.89%
17	Oak Hill ES Indiana	71,623 600 119	2,000 3.57%	2,859 5.11%	320 0.57%	2,300 4.11%	48,517 86.64%	55,996	5,023 8.97%	10,604 18.94%	15,627 27.91%
18	Alum Creek ES Ohio	82,330 650 127	1,964 3.26%	2,555 4.24%	460 0.76%	1,968 3.26%	53,379 88.48%	60,326	8,544 14.16%	13,460 22.31%	22,004 36.48%

COMPARISONS OF ELEMENTARY SCHOOL SPACES (cont.)

		GROSS SF									
		# of students	Toilet	Mech/	Janitor	Food	Other	NET SF	Const.	Circul.	TOTAL
		GSF/student	Rooms	Electrical		Service	Spaces				C&C
19	Tussing ES	76,492	2,297	3,831	457	1,571	48,634	56,790	8,259	11,443	19,702
	Ohio	650	4.04%	6.75%	0.80%	2.77%	85.64%		14.54%	20.15%	34.69%
		118									
20	Sabina ES	55,600	1,505	1,951	422	2,097	34,938	40,913	5,035	9,652	14,687
	Ohio	600	3.68%	4.77%	1.03%	5.13%	85.40%		12.31%	23.59%	35.90%
		93									
21	New Vienna ES	43,001	1,250	1,632	532	1,626	26,724	31,764	3,902	7,335	11,237
	Ohio	340	3.94%	5.14%	1.67%	5.12%	84.13%		12.28%	23.09%	35.38%
		126									
22	Columbia ES	96,659	2,796	3,121	208	3,439	65,259	74,823	7,041	14,795	21,836
	Ohio	650	3.74%	4.17%	0.28%	4.60%	87.22%		9.41%	19.77%	29.18%
		149									
23	Holly ES	59,371	1,948	1,932	315	1,142	40,598	45,935	3,057	10,379	13,436
	Michigan	475	4.24%	4.21%	0.69%	2.49%	88.38%		6.66%	22.59%	29.25%
		125									
24	Union Local ES	79,478	2,043	2,003	153	1,803	53,795	59,797	8,009	11,672	19,681
	Ohio	900	3.42%	3.35%	0.26%	3.02%	89.96%		13.39%	19.52%	32.91%
		88									
25	Springfield ES	72,656	1,825	4,552	275	2,072	48,980	57,704	6,216	11,757	17,973
	Indiana	470	3.16%	7.89%	0.48%	3.59%	84.88%		10.77%	20.37%	31.15%
		155									
26	Edison ES	84,703	3,248	4,775	255	3,182	52,302	63,762	6,770	14,171	20,941
	Indiana	600	5.09%	7.49%	0.40%	4.99%	82.03%		10.62%	22.22%	32.84%
		141									
27	Morton ES	84,703	3,248	4,775	255	3,182	52,302	63,762	6,770	14,171	20,941
	Indiana	600	5.09%	7.49%	0.40%	4.99%	82.03%		10.62%	22.22%	32.84%
		141									
28	Maywood ES	87,671	2,972	6,734	345	2,706	50,721	63,478	9,931	14,262	24,193
	Indiana	600	4.68%	10.61%	0.54%	4.26%	79.90%		15.64%	22.47%	38.11%
		146									
29	Gateway North ES	54,653	2,196	2,941	145	931	38,396	44,609	1,314	8,730	10,044
	Michigan	300	4.92%	6.59%	0.33%	2.09%	86.07%		2.95%	19.57%	22.52%
		182									
30	Oakview South ES	54,653	2,196	2,941	145	931	38,396	44,609	1,314	8,730	10,044
	Michigan	300	4.92%	6.59%	0.33%	2.09%	86.07%		2.95%	19.57%	22.52%
		182									
31	Fishback Creek PA	91,412	2,056	5,766	285	2,615	55,470	66,192	7,864	17,356	25,220
	Indiana	600	3.11%	8.71%	0.43%	3.95%	83.80%		11.88%	26.22%	38.10%
		152									
32	Buckner ES	70,692	2,009	3,807	146	1,246	42,074	49,282	9,021	12,389	21,410
	Kentucky	600	4.08%	7.72%	0.30%	2.53%	85.37%		18.30%	25.14%	43.44%
		118									
33	Prairie Trace ES	88,742	2,034	6,398	327	1,514	57,761	68,034	7,989	12,719	20,708
	Indiana	725	2.99%	9.40%	0.48%	2.23%	84.90%		11.74%	18.70%	30.44%
		122									
34	Harrison Parkway ES	78,921	2,020	3,293	277	2,195	53,454	61,239	6,177	11,505	17,682
	Indiana	650	3.30%	5.38%	0.45%	3.58%	87.29%		10.09%	18.79%	28.87%
		121									
35	Meadows Edge ES	57,224	1,383	5,636	399	1,503	36,467	45,388	4,383	7,453	11,836
	Indiana	450	3.05%	12.42%	0.88%	3.31%	80.35%		9.66%	16.42%	26.08%
		127									
36	Northpoint ES	57,224	1,383	5,636	399	1,503	36,467	45,388	4,383	7,453	11,836
	Indiana	450	3.05%	12.42%	0.88%	3.31%	80.35%		9.66%	16.42%	26.08%
		127									

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF ELEMENTARY SCHOOL SPACES (cont.)

		GROSS SF									
		# of students	Toilet	Mech/	Janitor	Food	Other	NET SF	Const.	Circul.	TOTAL
		GSF/student	Rooms	Electrical		Service	Spaces				C&C
37	Towne Meadow ES Indiana	87,471 725 121	2,044 2.90%	6,803 9.66%	117 0.17%	1,716 2.44%	59,733 84.83%	70,413	4,566 6.48%	12,492 17.74%	17,058 24.23%
38	Discovery ES Michigan	79,400 400 199	2,319 4.03%	3,623 6.30%	384 0.67%	1,280 2.22%	49,940 86.78%	57,546	5,202 9.04%	16,652 28.94%	21,854 37.98%
39	Deerfield ES Michigan	83,084 560 148	2,720 4.24%	4,878 7.60%	556 0.87%	1,448 2.26%	54,579 85.04%	64,181	7,455 11.62%	11,448 17.84%	18,903 29.45%
40	Cheyenne ES Michigan	101,000 800 126	3,029 3.87%	3,656 4.67%	232 0.30%	1,713 2.19%	69,700 88.98%	78,330	5,686 7.26%	16,984 21.68%	22,670 28.94%
41	Scioto Ridge ES Ohio	72,830 650 112	1,463 2.72%	2,532 4.71%	473 0.88%	2,747 5.11%	46,557 86.58%	53,772	6,566 12.21%	12,492 23.23%	19,058 35.44%
42	Arrowhead ES Ohio	72,830 650 112	1,463 2.72%	2,532 4.71%	473 0.88%	2,747 5.11%	46,557 86.58%	53,772	6,566 12.21%	12,492 23.23%	19,058 35.44%
43	Oak Creek ES Ohio	71,419 650 110	1,506 2.81%	3,418 6.37%	222 0.41%	2,069 3.85%	46,474 86.56%	53,689	4,473 8.33%	13,257 24.69%	17,730 33.02%
44	Tyler Run ES Ohio	72,803 650 112	1,506 2.73%	3,418 6.21%	222 0.40%	2,069 3.76%	47,858 86.90%	55,073	4,473 8.12%	13,257 24.07%	17,730 32.19%
45	Hoosier Rd. ES Indiana	78,850 650 121	2,462 3.97%	3,293 5.32%	290 0.47%	2,195 3.54%	53,703 86.70%	61,943	5,983 9.66%	10,924 17.64%	16,907 27.29%
46	South Lebanon ES Ohio	75,008 500 150	1,801 3.31%	6,458 11.85%	308 0.57%	1,735 3.18%	44,180 81.09%	54,482	6,854 12.58%	13,672 25.09%	20,526 37.67%
47	Kings Mills ES Ohio	78,285 600 130	2,516 4.26%	5,649 9.56%	206 0.35%	1,663 2.82%	49,030 83.01%	59,064	7,133 12.08%	12,088 20.47%	19,221 32.54%
48	H.G. Blake ES Ohio	75,191 600 125	2,324 4.27%	5,654 10.38%	723 1.33%	2,285 4.19%	43,504 79.84%	54,490	5,080 9.32%	15,621 28.67%	20,701 37.99%
49	Ryan Park ES Indiana	78,679 500 157	2,237 3.94%	5,033 8.86%	204 0.36%	2,796 4.92%	46,516 81.91%	56,786	6,008 10.58%	15,885 27.97%	21,893 38.55%
50	Leighton ES Ohio	79,978 700 114	1,894 3.03%	3,975 6.35%	325 0.52%	2,460 3.93%	53,923 86.17%	62,577	4,171 6.67%	13,230 21.14%	17,401 27.81%
51	Monroe Road ES Michigan	76,360 700 109	2,026 3.58%	4,499 7.95%	150 0.27%	1,289 2.28%	48,600 85.92%	56,564	6,161 10.89%	13,635 24.11%	19,796 35.00%
52	Moreland Hills ES Ohio	124,875 1,000 125	3,937 4.48%	7,768 8.83%	386 0.44%	1,233 1.40%	74,621 84.85%	87,945	15,419 17.53%	21,511 24.46%	36,930 41.99%
53	Snacks Crossing ES Indiana	94,866 700 136	2,832 3.98%	4,103 5.77%	322 0.45%	2,830 3.98%	61,002 85.81%	71,089	7,120 10.02%	16,657 23.43%	23,777 33.45%
54	Auburn ES Virginia	81,740 650 126	2,300 3.71%	3,134 5.05%	458 0.74%	2,744 4.42%	53,415 86.08%	62,051	7,420 11.96%	12,269 19.77%	19,689 31.73%
55	Zionsville ES Indiana	88,590 600 148	2,235 3.44%	7,615 11.73%	375 0.58%	2,614 4.03%	52,081 80.22%	64,920	7,477 11.52%	16,193 24.94%	23,670 36.46%

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF ELEMENTARY SCHOOL SPACES (cont.)

56	Freedom ES Ohio	59,469 500 119	1,699 3.70%	3,081 6.72%	450 0.98%	1,978 4.31%	38,650 84.28%	45,858	5,598 12.21%	8,013 17.47%	13,611 29.68%
57	Unity ES Ohio	59,480 500 119	1,570 3.49%	2,516 5.59%	320 0.71%	1,852 4.12%	38,739 86.09%	44,997	5,692 12.65%	8,791 19.54%	14,483 32.19%
58	Montgomery ES Ohio	78,675 625 126	1,653 2.91%	3,535 6.22%	293 0.52%	1,678 2.95%	49,649 87.40%	56,808	8,511 14.98%	13,356 23.51%	21,867 38.49%
59	Brooks School Elem Indiana	93,333 700 133	2,916 4.27%	2,539 3.71%	296 0.43%	2,356 3.45%	60,249 88.14%	68,356	8,182 11.97%	16,795 24.57%	24,977 36.54%
60	Blue Ash ES Ohio	80,821 625 129	2,249 3.47%	5,997 9.26%	191 0.30%	1,975 3.05%	54,325 83.92%	64,737	3,690 5.70%	12,394 19.15%	16,084 24.85%
61	Harrison ES Indiana	119,724 872 137	3,580 4.20%	6,227 7.30%	532 0.62%	3,206 3.76%	71,714 84.11%	85,259	9,378 11.00%	25,087 29.42%	34,465 40.42%
62	South Park ES Pennsylvania	114,992 800 144	4,420 5.47%	7,449 9.22%	331 0.41%	2,891 3.58%	65,708 81.32%	80,799	8,888 11.00%	25,305 31.32%	34,193 42.32%
63	Andrews ES Indiana	73,458 412 178	1,989 3.81%	4,646 8.89%	549 1.05%	2,256 4.32%	42,821 81.94%	52,261	5,415 10.36%	15,782 30.20%	21,197 40.56%
64	Flint Springs ES Indiana	82,694 562 147	2,073 3.48%	4,646 7.80%	549 0.92%	2,256 3.79%	50,059 84.02%	59,583	5,991 10.05%	17,120 28.73%	23,111 38.79%
65	Lincoln ES Indiana	84,014 562 149	2,073 3.40%	4,646 7.63%	549 0.90%	2,256 3.70%	51,379 84.36%	60,903	5,991 9.84%	17,120 28.11%	23,111 37.95%
66	Ridge Wood ES Michigan	80,310 450 178	2,719 4.41%	4,204 6.82%	496 0.81%	1,239 2.01%	52,948 85.95%	61,606	3,957 6.42%	14,747 23.94%	18,704 30.36%
67	Patterson ES District of Columbia	81,007 520 156	3,162 4.86%	4,633 7.12%	387 0.60%	1,050 1.61%	55,800 85.80%	65,032	1,438 2.21%	14,537 22.35%	15,975 24.56%
68	Mary Beck ES Indiana	89,615 600 149	2,697 4.14%	3,840 5.89%	252 0.39%	1,344 2.06%	57,035 87.52%	65,168	7,921 12.15%	16,526 25.36%	24,447 37.51%
69	Max Larsen ES Michigan	64,914 425 153	2,010 4.19%	3,570 7.44%	750 1.56%	812 1.69%	40,829 85.11%	47,971	4,340 9.05%	12,603 26.27%	16,943 35.32%
70	Hevel ES Michigan	72,783 463 157	2,471 4.64%	6,339 11.91%	472 0.89%	1,109 2.08%	42,852 80.48%	53,243	7,291 13.69%	12,249 23.01%	19,540 36.70%
71	Deer Meadow PS** Indiana	68,020 378 180	1,660 3.50%	4,400 9.29%	469 0.99%	2,410 5.09%	38,440 81.13%	47,379	8,725 18.42%	11,916 25.15%	20,641 43.57%
	**core facilities for 600										
72	Crown Point ES Indiana	91,000 650 140	2,250 3.52%	7,356 11.50%	441 0.69%	3,065 4.79%	50,875 79.51%	63,987	11,503 17.98%	15,510 24.24%	27,013 42.22%
73	Stockbridge ES Michigan	62,963 425 148	1,938 3.89%	4,492 9.02%	531 1.07%	1,238 2.49%	41,590 83.53%	49,789	2,133 4.28%	11,041 22.18%	13,174 26.46%
ES AVERAGE		131	3.71%	7.21%	0.63%	3.40%	85.05%		10.65%	23.00%	33.65%
		GSF/student	Toilet Rm	M/E	Janitor	Food Svc	Other		Const	Circ	C & C

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
 CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

COMPARISONS OF K-12 SCHOOL SPACES

		GROSS SF									
		# of students	Toilet	Mech/	Janitor	Food	Other	NET SF	Const.	Circul.	TOTAL
		GSF/student	Rooms	Electrical		Service	Spaces				C&C
1	Twin Valley South Ohio	198,890 1,300 153	3,686 2.32%	14,849 9.35%	894 0.56%	4,512 2.84%	134,893 84.93%	158,834	13,768 8.67%	26,288 16.55%	40,056 25.22%
2	Edon Northwest Ohio	131,153 890 147	3,313 3.38%	5,882 6.00%	502 0.51%	3,073 3.14%	85,183 86.96%	97,953	10,247 10.46%	22,953 23.43%	33,200 33.89%
3	Ft. Jennings Ohio	103,235 643 161	2,195 2.74%	5,173 6.45%	144 0.18%	3,519 4.39%	69,132 86.24%	80,163	6,186 7.72%	16,886 21.06%	23,072 28.78%
4	Mississinawa Ohio	112,585 750 150	2,718 3.23%	5,245 6.22%	212 0.25%	2,462 2.92%	73,627 87.38%	84,264	8,672 10.29%	19,649 23.32%	28,321 33.61%
5	Adena Ohio	189,112 700 270	3,351 2.43%	2,270 1.65%	266 0.19%	4,577 3.32%	127,277 92.40%	137,741	15,557 11.29%	35,814 26.00%	51,371 37.30%
6	Riverdale Ohio	164,522 720 229	4,155 3.30%	8,246 6.56%	758 0.60%	4,177 3.32%	108,395 86.21%	125,731	11,244 8.94%	27,547 21.91%	38,791 30.85%
7	Morgan Township Indiana	137,000 775 177	4,108 4.02%	2,924 2.86%	551 0.54%	2,518 2.47%	91,992 90.11%	102,093	11,862 11.62%	23,045 22.57%	34,907 34.19%
8	New London Ohio	162,485 1,200 135	4,906 4.05%	4,630 3.83%	776 0.64%	3,870 3.20%	106,829 88.28%	121,011	13,533 11.18%	27,941 23.09%	41,474 34.27%
9	Antwerp Ohio	140,135 982 143	3,416 3.24%	6,723 6.37%	576 0.55%	3,412 3.23%	91,368 86.61%	105,495	12,738 12.07%	21,902 20.76%	34,640 32.84%
	MS AVERAGE	168 GSF/student	3.19% Toilet Rm	5.48% M/E	0.45% Janitor	3.20% Food Svc	87.68% Other		10.25% Const	22.08% Circ	32.33% C & C

Summary of Findings

SUMMARY OF FINDINGS

Many times in the initial design phase of new educational facilities, we are faced with a shortage of square footage as the building design progresses. The net programmed area has been determined and various factors have been applied to compensate for support, construction, and circulation space. As the design evolves, it becomes apparent that we are facing a square footage overrun in relation to the budget.

In the interest of continuing to support our colleagues, Fanning/Howey Associates, Inc. continued post-construction analysis of recent educational facility designs and tabulated the findings. The data was extracted from the final construction drawings of 158 educational facilities designed and constructed within the last twelve years.

The purpose of this research is to provide architects and educational planners with hard data regarding the necessary space requirements for restrooms, mechanical rooms, custodial spaces, food service, construction enclosure space, and circulation and corridor space. The end result of the analysis will suggest a rationale for the development of educational specifications and building programming activities. The data also provides a general indication of average required square feet per student.

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
CEFPI MINI-SESSION PRESENTATION
Phoenix, Arizona
October 21, 2002

Itemized data was developed that illustrates variations and similarities in the following categories: elementary schools, junior high/middle schools, K12 schools, and high schools. The data shown represents tabulations from 73 elementary schools, 37 middle schools, 9 K12 schools, and 39 high schools. Elementary schools ranged in size from 300 to 1,000 students; junior high/middle schools ranged in size from 504 to 1,600 students; k12 schools ranged in size from 643 to 1,300 students, and high schools ranged in size from 500 to 2,300 students.

BUILDING SIZE RANGES

Building size in area per student can be summarized as follows:

SF / student	Elementary Schools	Middle Schools	K12 Schools	High School
Low	88	114	134	133
High	199	214	177	297
Average*	132	161	146	193

* Taking out the schools with the highest and lowest SF/student

BUILDING AREA ANALYSIS

The following ranges were noted (as a percentage of net programmed area):

	Elementary Schools	Middle Schools	K12 Schools	High Schools
Restrooms	2.73 - 5.47	2.27 - 5.10	2.32 - 4.05	1.78 - 3.88
Mechanical/Electrical	3.35 - 12.42	4.13 - 10.86	1.65 - 9.35	2.39 - 12.68
Custodial	0.17 - 1.67	0.24 - 1.27	.18 - .64	0.19 - 1.86
Food Service	1.13 - 5.13	1.78 - 6.34	2.47 - 4.39	1.65 - 5.47
Construction	2.21 - 18.42	2.06 - 17.19	7.72 - 12.07	3.59- 24.27
Circulation	16.42 - 31.32	17.38 - 31.75	16.55 - 26.00	19.93 - 32.07

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
CEFPI MINI-SESSION PRESENTATION
Phoenix, Arizona
October 21, 2002

The following averages were noted (as a percentage of net programmed area):

	Elementary Schools	Middle Schools	K12 Schools	High Schools
Restrooms	3.71	3.32	3.19	2.87
Mechanical/Electrical	7.21	7.09	5.48	5.97
Custodial	0.63	0.58	.45	0.71
Food Service	3.40	3.41	3.20	3.23
Construction	10.65	10.53	10.25	11.54
Circulation	23.00	24.61	22.08	25.84
Total	48.60	49.54	44.65	50.16

The areas shown begin to suggest that programming percentages for the various categories can vary dramatically, depending on building systems utilized and the type of building enclosure, as well as the efficiency of the design. We realize that geography and owner needs also affect the square footage requirements. Perhaps a more accurate analysis would involve inclusion of necessary restrooms, mechanical/electrical spaces, custodial needs, and food service requirements in the net programmed area.

The total percentages of net area for circulation and construction would calculate as follows:

	Elementary Schools	Middle Schools	K12 Schools	High Schools
Construction	10.65	10.53	10.25	11.54
Circulation	23.00	24.61	22.08	25.84
Total	33.65	35.14	32.33	37.38

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
CEFPI MINI-SESSION PRESENTATION
Phoenix, Arizona
October 21, 2002

Based on the facilities examined, it would appear that 32% - 38% should be added to net programmed areas for construction and circulation, depending on the type of building being developed (Gross SF = 1.39 times the net SF; or Net SF = .719 times the gross SF). [1/1.38 = .719] Net programmed areas should include the necessary restroom, custodial, mechanical/electrical, and food service requirements.

BUILDING SIZE RANGE EXAMPLE PROJECTS

<u>CATEGORIES</u>	<u>NAME</u>	<u>SF/STUDENT</u>	<u>CAPACITY</u>
<u>High Schools</u>			
Low	Ocean Lakes HS, VA	133	2,300
High	Milan HS, MI	297	900
Average*	Northridge HS, OH	192	500
<u>Middle Schools</u>			
Low	North Oldham MS, KY	114	700
High	Crestview MS, IN	214	750
Average*	Greyhound Int. School, IN	162	550
<u>Elementary Schools</u>			
Low	Union Local ES, OH	88	900
High	Discovery ES, MI	199	400
Average*	Brooks School Elem, IN	133	700
<u>K12 Schools</u>			
Low	Adena, OH	134	1,414
High	Morgan Township, IN	177	775
Average*	Edon Northwest, OH	146	890

(*Taking out the schools with the highest and lowest SF/student)

As more data is entered into our database, we will update and revise the percentages. We would also welcome information from other design firms regarding this subject.

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
CEFPI MINI-SESSION PRESENTATION
 Phoenix, Arizona
 October 21, 2002

VALIDATION OF FINDINGS

Fanning/Howey Associates, Inc. first began tracking this information in 1996. At that time, only **40** school buildings were analyzed. This number grew to 60 buildings in 1997, 74 buildings in 1998, 87 buildings in 1999, 107 buildings in 2000, 123 buildings in 2001, and **158** buildings in 2002. Below are comparisons of the findings from each year.

Building size in area per student for each year can be summarized for high schools as follows:

HIGH SCHOOLS

SF/Stud.	'96	'97	'98	'99	'00	'01	'02
Low	155	133	133	133	133	133	133
High	258	2582	258	278	278	278	297
Average	184	181	193*	193*	191*	188*	193*
The following <u>averages</u> were noted for each year (as a percentage of net programmed area):							
Rest	2.92	2.82	2.58	2.73	2.79	2.79	2.87
Mech/ Elect	5.61	5.17	5.64	5.52	5.64	5.76	5.97
Cust	0.56	0.73	0.70	0.65	0.66	0.67	0.71
Food Svc	3.19	3.22	3.19	3.19	3.26	3.24	3.23
Const	12.80	12.97	11.43	12.49	12.07	11.54	11.54
Circ	26.98	26.94	25.92	26.14	25.82	25.58	25.84
Total	52.06	51.85	49.46	50.72	50.24	49.58	50.16

* The schools with the highest and lowest SF/student were taken out.

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
CEFPI MINI-SESSION PRESENTATION
Phoenix, Arizona
October 21, 2002

Building size in area per student for each year can be summarized for middle schools as follows:

MIDDLE SCHOOLS

SF/Stud.	'96	'97	'98	'99	'00	'01	'02
Low	114	114	114	114	114	114	114
High	209	209	214	214	214	214	214
Average	172	169	163*	163*	162*	161*	161*
The following <u>averages</u> were noted for each year (as a percentage of net programmed area):							
Rest	3.07	3.12	3.32	3.31	3.28	3.30	3.32
Mech/ Elect	6.33	6.28	7.25	7.26	7.53	7.17	7.09
Cust	0.49	0.55	0.57	0.57	0.55	0.58	0.58
Food Svc	3.05	3.17	3.52	3.54	3.52	3.45	3.41
Const	11.35	12.76	10.52	10.42	10.42	10.64	10.53
Circ	23.76	25.12	24.23	24.36	24.64	24.50	24.61
Total	48.05	51.00	49.41	49.46	49.94	49.64	49.54

* The schools with the highest and lowest SF/student were taken out.

PROGRAMMING CIRCULATION FACTORS IN K-12 FACILITIES
CEFPI MINI-SESSION PRESENTATION
Phoenix, Arizona
October 21, 2002

Building size in area per student for each year can be summarized for elementary schools as follows:

ELEMENTARY SCHOOLS

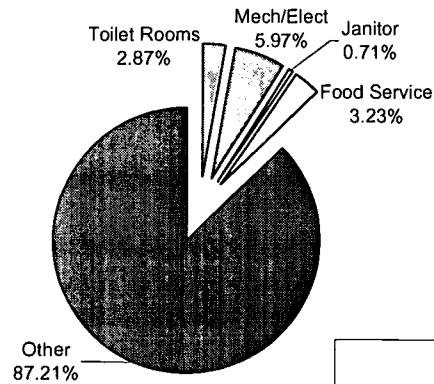
SF/ Student	'96	'97	'98	'99	'00	'01	'02
Low	88	88	88	88	88	88	88
High	144	182	190	199	199	199	199
Average	120	128	125*	128*	126*	132*	132*
The following <u>averages</u> were noted for each year (as a percentage of net programmed area):							
Rest	3.46	3.70	3.69	3.66	3.63	3.66	3.71
Mech/ Elect	5.73	6.30	6.41	6.78	6.91	6.98	7.21
Cust	0.64	0.55	0.59	0.59	0.59	0.59	0.63
Food Svc	3.32	3.44	3.45	3.33	3.44	3.47	3.40
Const	11.33	12.13	11.05	10.49	10.59	10.69	10.65
Circ	21.74	21.69	22.42	22.03	22.40	22.57	23.00
Total	46.22	47.81	47.61	46.88	47.56	47.96	48.60

* The schools with the highest and lowest SF/student were taken out.

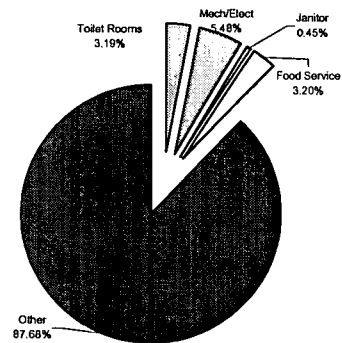
Although there was an increase of 118 buildings in the analysis, the averages and findings are very similar. This shows that the additional information confirms the original information.

Comparisons of NET Spaces in Educational Facilities

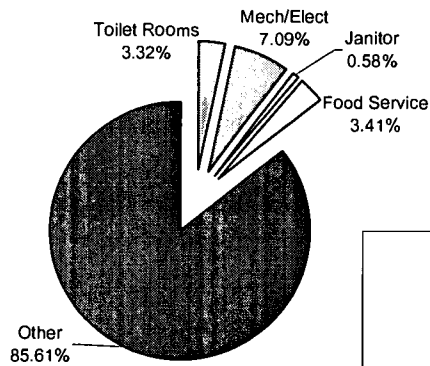
High School Spaces



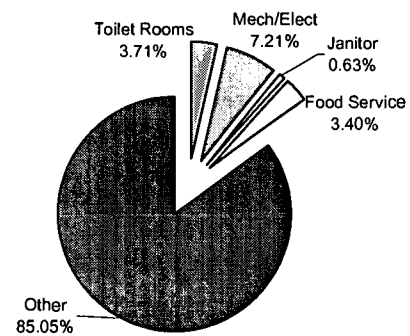
K12 School Spaces



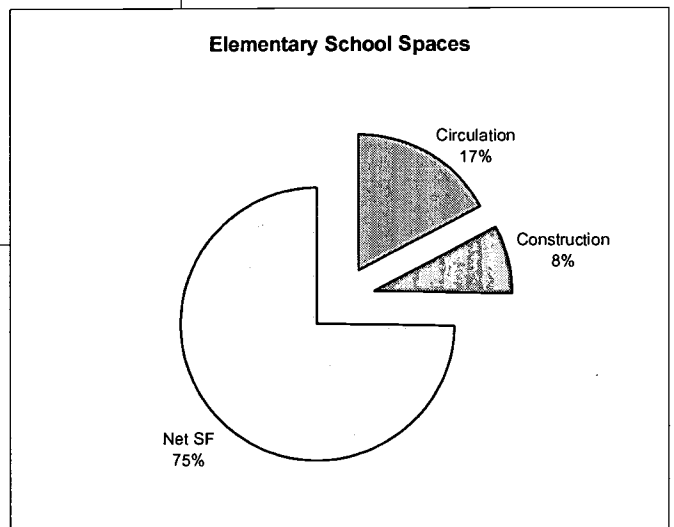
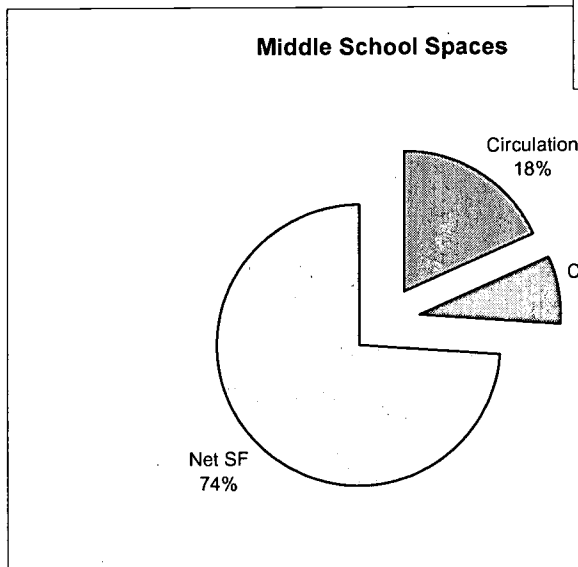
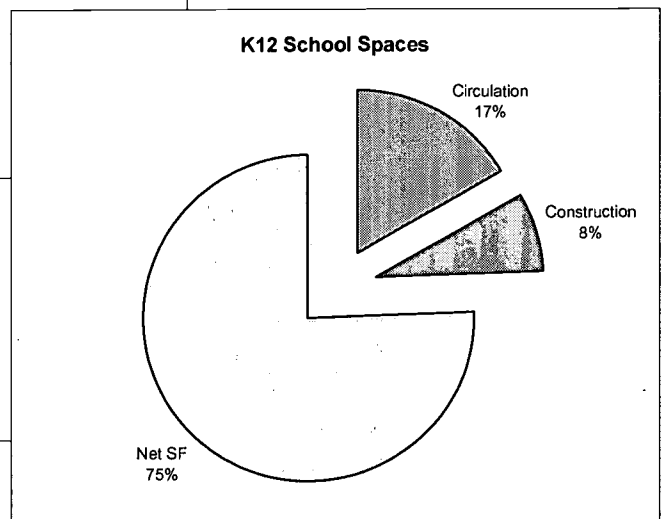
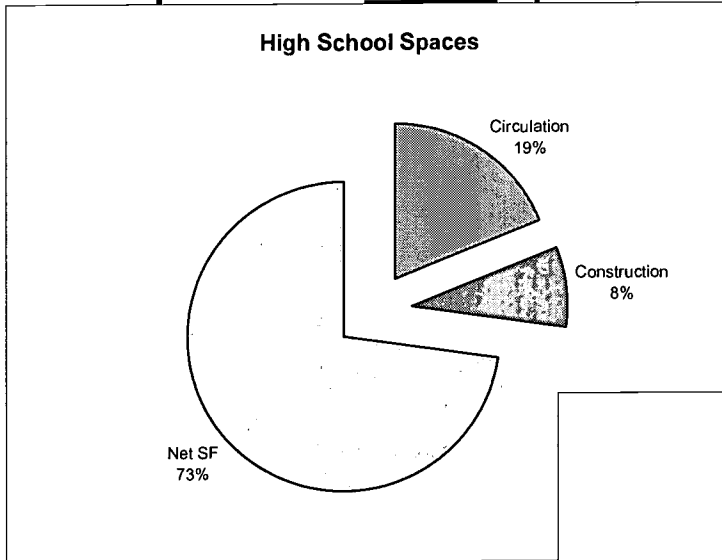
Middle School Spaces



Elementary School Spaces



Comparisons of GROSS Spaces in Educational Facilities



Fanning/Howey Associates, Inc. Profile

Firm Profile

INTRODUCTION

Fanning/Howey Associates, Inc. is an architectural/engineering/consulting firm providing professional services to educational clients for 41 years.

CLIENTELE

Fanning/Howey's extensive design experience, as well as our reputable background in service, has resulted in clientele in Alaska, Colorado, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Maryland, Michigan, Minnesota, Montana, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Virginia, West Virginia, Washington, Washington DC, Wisconsin, and the Philippines.

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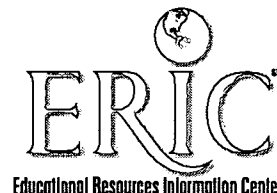
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